

REMARKS

Entry of the foregoing, reconsideration and reexamination of the above-identified application are respectfully requested.

Upon review of the prior amendment to claim 29, it was noted that text of the claim was inadvertently omitted. To avoid any confusion, claim 29 has thus been deleted and reintroduced as new claim 47. The non-elected claims, claims 19, 20, 23-28, 31 and 37-46 have also been deleted. Applicants reserve the right to present these claims in a continuation application.

Claims 13, 14, 30 and 32 have been amended to recite that the "oil is produced by culturing a producer microorganism in a fermentor with aeration." These claims thus now recite "product-by-process" language, as helpfully suggested by the Examiner. The Official Action stated on page 5 that a "product-by-process" claim would be favorably considered.

Claims 38-41 have been added to specify that the medium contains "soybean protein as a nitrogen source." Claims 42-47 have also been added to define the arachidonic acid-containing oil in "product-by-process" language and to specify that the producer microorganism is of the genus *Mortierella* subgenus *Mortierella*. Claims 48-50 recite a nutritive dietary supplement comprising such an oil. These claims are supported by the specification, for example, at the very least at page 3, lines 1-20 and page 5, lines 3-11. No new matter is added by these amendments.

Claims 13, 14, 29, 30 and 32-36 have been rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 1-5 of U.S. Patent No. 6,117,905. This rejection is respectfully traversed.

The Official Action asserts that the '905 Patent claims have a narrower scope regarding the amount of 24,25-methylencholest-5-en-3 β -ol, and a broader scope with respect to the amount of arachidonic acid (30-50% herein vs more than 20% in the '905 Patent). However, the claims of the '905 Patent do not render obvious those of the instant application.

The amounts of 24,25-methylencholest-5-en-3 β -ol in the arachidonic acid-containing oils are not comparable. In the '905 Patent, the arachidonic acid-containing lipid has a reduced level of 24,25-methylencholest-5-en-3 β -ol. By contrast, in the instant invention, the level of 24,25-methylencholest-5-en-3 β -ol is reduced, not at an absolute level, but instead at a level relative to the desmosterol compositional ratio. For example, the claims require that the 24,25-methylencholest-5-en-3 β -ol compositional ratio is in a proportion of 1.2 or less with respect to the desmosterol compositional ratio or is 35% or lower. The '905 Patent teaches nothing regarding the compositional ratio of 24,25-methylencholest-5-en-3 β -ol in the oil. The oil having the claimed ratio is thus in no way disclosed or even suggested in the '905 Patent. Nor does the teaching of a range of arachidonic acid of 20% or more teach the specifically claimed range of 30 to 50%. Furthermore, the claims of the '905 Patent neither disclose nor suggest producing such an

oil "by culturing a producer microorganism in a fermentor with aeration," as now required by the claims.

Obviousness-type double patenting thus does not exist between the instant claims and those of the '905 Patent. Withdrawal of this rejection is respectfully requested and believed to be in order.

Claims 13, 14, 29, 30 and 32-36 have been rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Shinmen et al in view of both Shimizu et al and Barclay. This rejection is respectfully traversed. This rejection is respectfully traversed.

Shinmen is said to teach that an unsaturated fatty acid-containing oil contains about 18-60% arachidonic acid. Shimizu et al is cited as teaching that unsaturated fatty acid-containing oil obtained from culturing microorganism *Mortierella* has 24,25-methylencholest-5-en-3 β -ol, which has not been found in nature. Barclay is cited as teaching the employment of arachidonic acid containing oil for food product, such as baby and animal food.

It allegedly would have been obvious to modify the unsaturated fatty acid-containing oil of Shinmen et al by removing the biologically unknown compound, i.e., 24,25-methylencholest-5-en-3 β -ol, and to employ the modified oil in food products, e.g., baby food, animal food or nutritive dietary supplement. It allegedly would have been obvious to remove the 24,25-methylencholest-5-en-3 β -ol since the biological activity was not known. There is nothing in the cited art, however, to teach how and whether the 24,25-methylencholest-5-en-3 β -ol could in fact be effectively separated from the oil in sufficient

amounts to fall within the instant claims. Nor is there any evidence that one skilled in the art would be motivated to remove sufficient amounts of 24,25-methylencholest-5-en-3 β -ol, or that the 24,25-methylencholest-5-en-3 β -ol could be removed in sufficient amounts to achieve the claimed compositional ratios. Absent evidence, a *prima facie* case of obviousness has not been made.

Moreover, none of the cited references teach an arachidonic acid-containing oil having such low compositional ratios of 24,25-methylencholest-5-en-3 β -ol, wherein the oil is produced by a process of culturing with aeration a producer microorganism, as now claimed. Nor do the references teach culturing in a fermentor with aeration in a medium containing soybean protein as a nitrogen source. Unexpectedly, using such conditions, the ratio of 24,25-methylencholest-5-en-3 β -ol is significantly reduced. *See, for example,* Example 1 in the instant specification, pages 11-12, wherein using a soybean protein medium versus a yeast resulted in the ratio of 24,25-methylencholest-5-en-3 β -ol to desmosterol being reduced by a factor of 5, i.e., 0.46 versus 2.41. Example 2 of the specification shows a reduction in the ratio from 4.25 to 0.47 by changing the culture medium to one containing soybean protein as a nitrogen source. Example 3 shows reductions from 1.32 to 0.07 and from 1.60 to 0.14. Such reductions in the ratio of 24,25-methylencholest-5-en-3 β -ol to desmosterol was surprising and unexpected. Moreover, the result is beneficial since low amounts of the 24,25-methylencholest-5-en-3 β -ol are desired.

None of the cited art teaches such an arachidonic acid-containing oil. Nor do the references teach or suggest such an oil produced by culturing an appropriate

microorganism in a fermentor with aeration under conditions to produce such an oil. To produce a fermentation product in an industrial or commercial amount, culturing a producer microorganism in a fermentor with aeration is essential. Culturing in a flask, as done in In Shimizu et al, is not practical to produce such large amounts. However, if a producer microorganism is cultured in a general medium in a fermentor with aeration, a high ratio of 24,25-methylencholest-5-en-3 β -ol, as shown in the Comparative Examples in Examples 1-3. This is not preferred for the commercial product. However, the present inventors surprisingly found that if the producer microorganism is cultured in a medium containing a soybean protein as a nitrogen source, the ratio of 24,25-methylencholest-5-en-3 β -ol is low. This finding was unexpected.

The rejection of the claims as amended herein under §103(a) is respectfully believed to be in error. In view of the above, withdrawal of the rejection of record over the cited art is respectfully requested. Such action is believed to be in order.

In the event that there are any questions relating to this Reply and Amendment, or to the application in general, it would be appreciated if the Examiner would telephone the undersigned attorney at 508-339-3684 concerning such questions so that prosecution of this application may be expedited.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: *D. Meuth Jan #39,300*
for Donna M. Meuth
Registration No. 36,607

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

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Application No. 09/254,152
Attorney's Docket No. 001560-344
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Attachment to Preliminary Amendment dated January 16, 2003

Marked-up Claims 13, 14, 30 and 32

13. (Three Times Amended) An arachidonic acid-containing oil [characterized by having] comprising a 24,25-methylencholest-5-en-3 β -ol compositional ratio in a proportion of 1.2 or less with respect to the desmosterol compositional ratio, and an arachidonic acid content of 30 to 50%, wherein said oil is produced by culturing a producer microorganism in a fermentor with aeration.

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14. (Three Times Amended) An arachidonic acid-containing oil [characterized by having] comprising a 24,25-methylencholest-5-en-3 β -ol compositional ratio of 35% or lower, a 24,25-methylencholest-5-en-3 β -ol compositional ratio in a proportion of 1.2 or less with respect to the desmosterol compositional ratio, and an arachidonic acid content of 30 to 50%, wherein said oil is produced by culturing a producer microorganism in a fermentor with aeration.

30. (Amended) An immature infant formula, infant formula, baby food or pregnancy food product comprising [an arachidonic acid-containing oil] a nutritive dietary supplement according to claim 29.

32. (Twice Amended) An arachidonic acid-containing oil [characterized by having] comprising a 24,25-methylencholest-5-en-3 β -ol compositional ratio of 35% or

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lower, and an arachidonic acid content of 30 to 50%, wherein said oil is produced by
culturing a producer microorganism in a fermentor with aeration.